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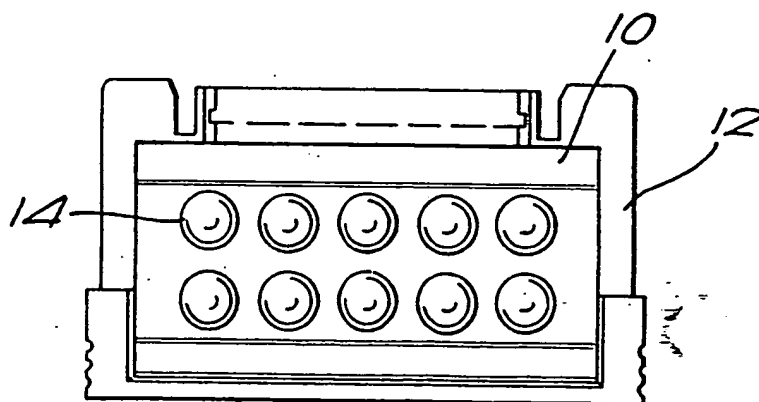
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB93/01965 (22) International Filing Date: 17 September 1993 (17.09.93) (30) Priority data: 9219875.3 19 September 1992 (19.09.92) GB (71) Applicant (for all designated States except US): GRASEBY MEDICAL LIMITED [GB/GB]; Colonial Way, Watford, Hertfordshire WD2 4LG (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): LINDSEY, Michael, John [GB/GB]; 366 High Street, Berkhamsted, Hertfordshire HP4 1HU (GB). (74) Agents: MAGGS, Michael, Norman et al.; Kilburn & Strode, 30 John Street, London WC1N 2DD (GB).</p>		<p>(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.</p>

(54) Title: PROGRAM CARD



(57) Abstract

A host apparatus (for example medical infusion pump equipment) is operated by means of controls on a replaceable program card/electronic card. A selection of different cards is provided, programmed differently, which allows the user of the apparatus to select between different operating regimes. Different cards may also provide for messages in different languages on an alphanumeric display.

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PROGRAM CARD

The present invention relates to so-called
5 "electronic cards" or electronic modules, and
particularly although not exclusively to such cards or
modules which come in a variety of types, one of which is
selected by the user and plugged in or otherwise attached
to a host apparatus. By choosing an appropriate card,
10 the user can arrange for the host apparatus to operate
according to one of a number of possible modes. The
program card may also include additional memory for the
host apparatus.

The use of such cards is well known in association
15 with personal computers, and with complex electronically
controlled apparatus such as cameras, both of which
incorporate the necessary electronic processors and
memory to provide the apparatus with a basic range of
user-controllable functions, which may be further
20 extended by use of electronic cards.

The present invention provides an electronic card
which itself incorporates user-adjustable controls,
thereby enabling a user to control, modify or adjust the
functioning of the program card and/or to control modify
25 or adjust the functioning of the host apparatus.

One embodiment of the invention, an electronic card
in accordance with the invention provides the whole
control function for the associated apparatus, thereby
enabling a basic apparatus to be provided with a range of
30 different functions, or sets of functions, by appropriate
change of electronic card.

The electronic card of such an embodiment may
incorporate and/or provide the control panel of the
associated apparatus.

In one application of the invention, medical infusion pump equipment comprising an electric pump, pressure sensor, electrically-operated fluid control valves and an electronic display, is able to provide a
5 range of different infusion regimes by choice of an electronic card, each one of which incorporates the appropriate controlling software and user controls for the respective regime.

The individual electronic cards may be marked to
10 indicate the regime provided, may be provided in versions having control markings in different languages and may be programmed to give display indications in a corresponding range of languages.

It will be appreciated that an electronic card in
15 accordance with the present invention provides a ready means of selecting the operating mode or regime of a basic piece of equipment, providing the user controls for that equipment, and of tailoring that equipment for sale into and use in markets with different languages.

20 The invention will be described by way of example with reference to the embodiment illustrated in the accompanying drawings of which:

Figure 1 shows an assembled controllable program card in accordance with the invention;

25 Figure 2 shows interior detail of the card of Figure 1;

Figure 3 shows the circuit diagram of circuitry incorporated in the card of Figure 1;

30 Figure 4 shows the front elevation of a medical infusion pump assembly adapted to receive the card of Figure 1;

Figure 5 shows the location of the card in the upper portion of the assembly of Figure 4; and

Figure 6 shows the upper part of the assembly of

Figure 4 with the card in place.

Referring to the drawings, an electronic card in accordance with the preferred embodiment of the invention is shown at 10, mounted with a carrier 12. The card
5 bears switch buttons 14 forming part of a membrane switch assembly within the body of the card. The switches operate to control various functions of apparatus with which the card is associated, via the electronic circuitry incorporated in the card.

10 Figure 2 illustrates the printed circuit board 20 incorporated within the card 10, carrying membrane switch pads 22, associated with the switch buttons 14, integrated circuits 24 and 26, and an electrical connector socket 28.

15 The circuit diagram of the electronic assembly carried by the board 20 is illustrated in Figure 3, the same parts carrying the same reference numerals.

Referring to Figure 4, a medical infusion pump assembly comprises a housing 40 incorporating pump, electromechanical valves, pressure sensor(s) (not shown)
20 and a flexible bag infusate reservoir 42. In operation the assembly is arranged to pump infusate from the reservoir 42 through flexible piping via controllable valves to the infusion cannula 44 to a patient, all under
25 the control of software carried within an electronic card, such as 10, which is shown in Figure 5 being put into place in the upper part of the housing 40.

To do that, the head 44 is drawn upwardly (to the right in Figure 5), the program card 10 inserted in the
30 recess 46, and the head 44 replaced into position, a mating connector (not shown) within the head 44 engaging with the socket 28 to effect electrical connection between the electronic card 10 and the infusion pump assembly 40.

5 In Figure 6, the infusion pump assembly 40 is shown with the card 10 in place, providing a front panel and control means for the pump assembly, to cause the components of the pump assembly 40 to function in a manner determined by the programming of the electronic card 10.

10 In a typical electronic card used in such an application the apparatus-controlling software is stored in reprogrammable flash memory, and operating data storage and history storage in an EEPROM device.

15 By providing a series of differently programmed cards 10, the same basic infusion pump assembly 40 can be made to function in different ways dependent upon the software program incorporated in the card plugged into the pump assembly.

The electronic card 10 may carry legends appropriate to the functions which it will permit the pump assembly to perform, and to the user controls, and may carry legends in the language of the user nationality.

20 The electronic card can, in addition to the programming associated with the pump functions, be programmed to deliver display messages in the language of the user.

25 It will be appreciated that various changes may be made without exceeding the scope of the invention. For example the electronic program card may be incorporated in other than medical instruments and may be incorporated in instruments already possessing control means, in which it could serve to provide a subsidiary control function.

30

CLAIMS:

1. An electronic card adapted to plug into or otherwise
5 be removably attached to a host apparatus, the card
having user-operable controls thereon by means of which,
when the card is attached as aforesaid to a host
apparatus, a user can control the operation of the host
apparatus.
- 10 2. An electronic card as claimed in Claim 1 which is
adapted to provide a replaceable user-operable control
panel for the said host apparatus.
- 15 3. A host apparatus including a removable electronic
card, the card having user-operable controls thereon by
means of which the user can control the operation of the
host apparatus.
- 20 4. A host apparatus as claimed in Claim 3 having no
user-operable controls other than those on the card.
5. A host apparatus as claimed in Claim 3 or Claim 4
having an alphanumeric display, the card including
25 display control means for controlling operation of the
display.
6. A host apparatus as claimed in any one of Claims 3
to 5 in combination with a plurality of removable
30 electronic cards, each of which is arranged to operate
the host apparatus differently.
7. A host apparatus as claimed in Claim 6 when
dependent upon Claim 5 in which the display control means

for each respective card is arranged to provide a display in a different language.

5 8. A host apparatus as claimed in any one of Claims 3 to 7 comprising medical infusion pump equipment.

9. A host apparatus as claimed in Claim 8 when dependent upon Claim 7 or upon Claim 6 in which each respective card provides a different infusion regime.

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FIG. 1

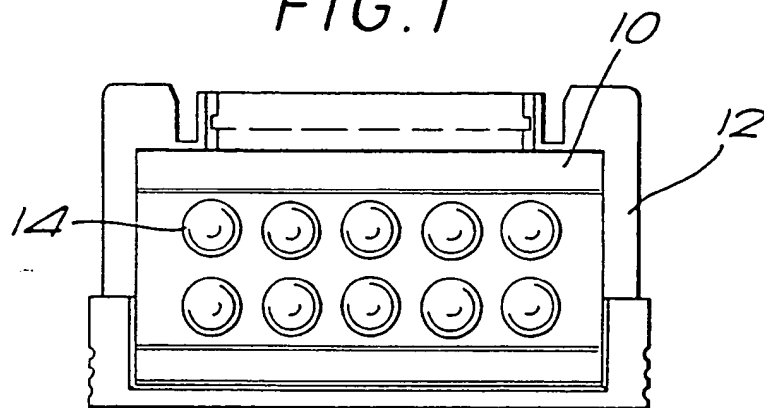
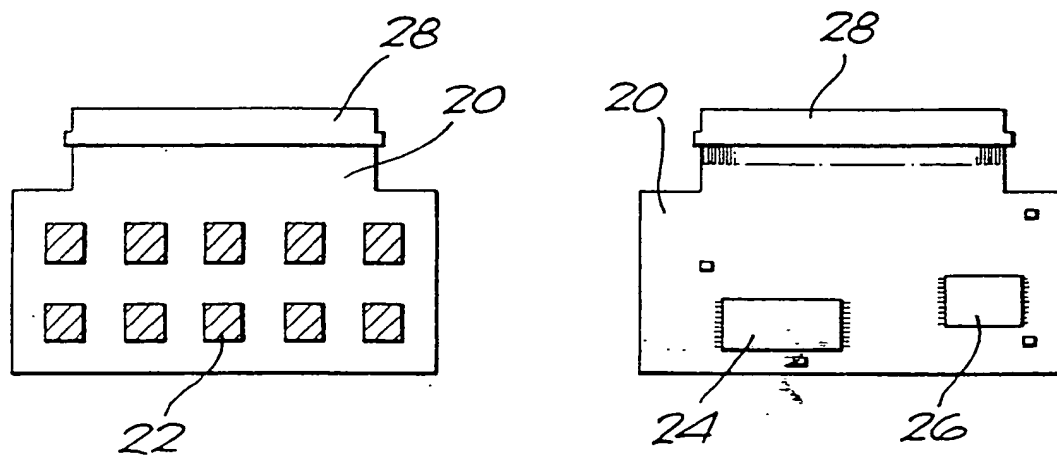
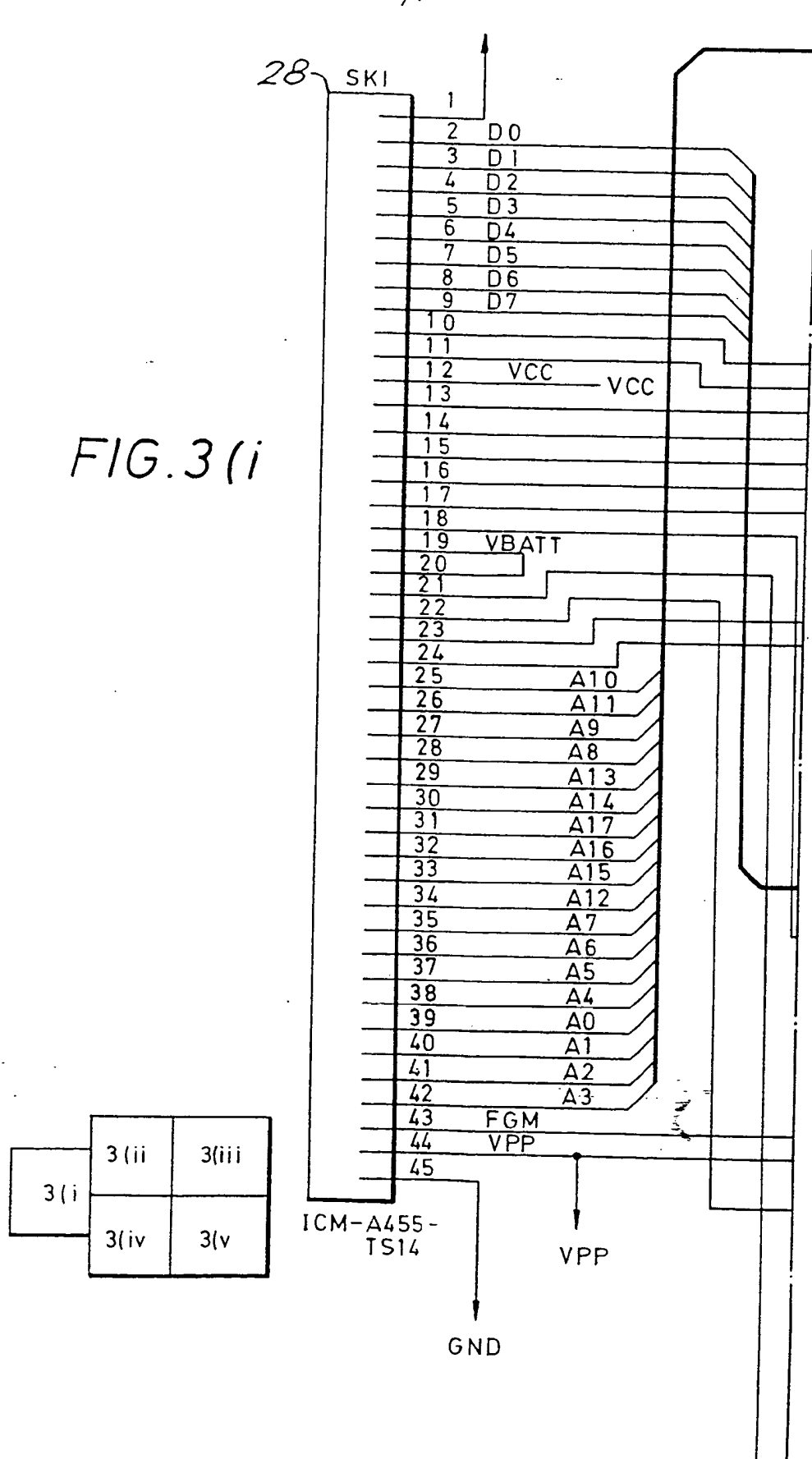


FIG. 2



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FIG. 3(i)



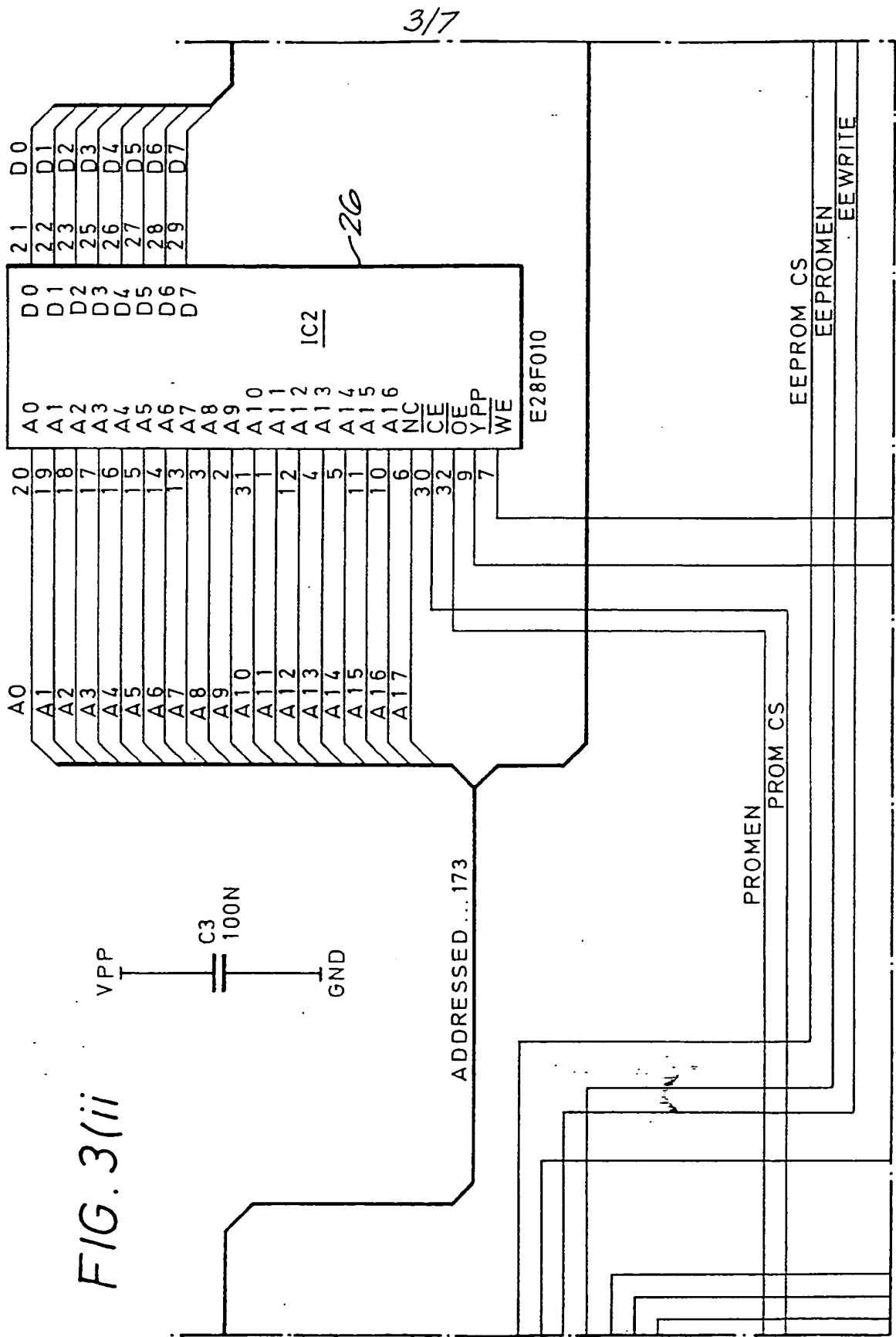
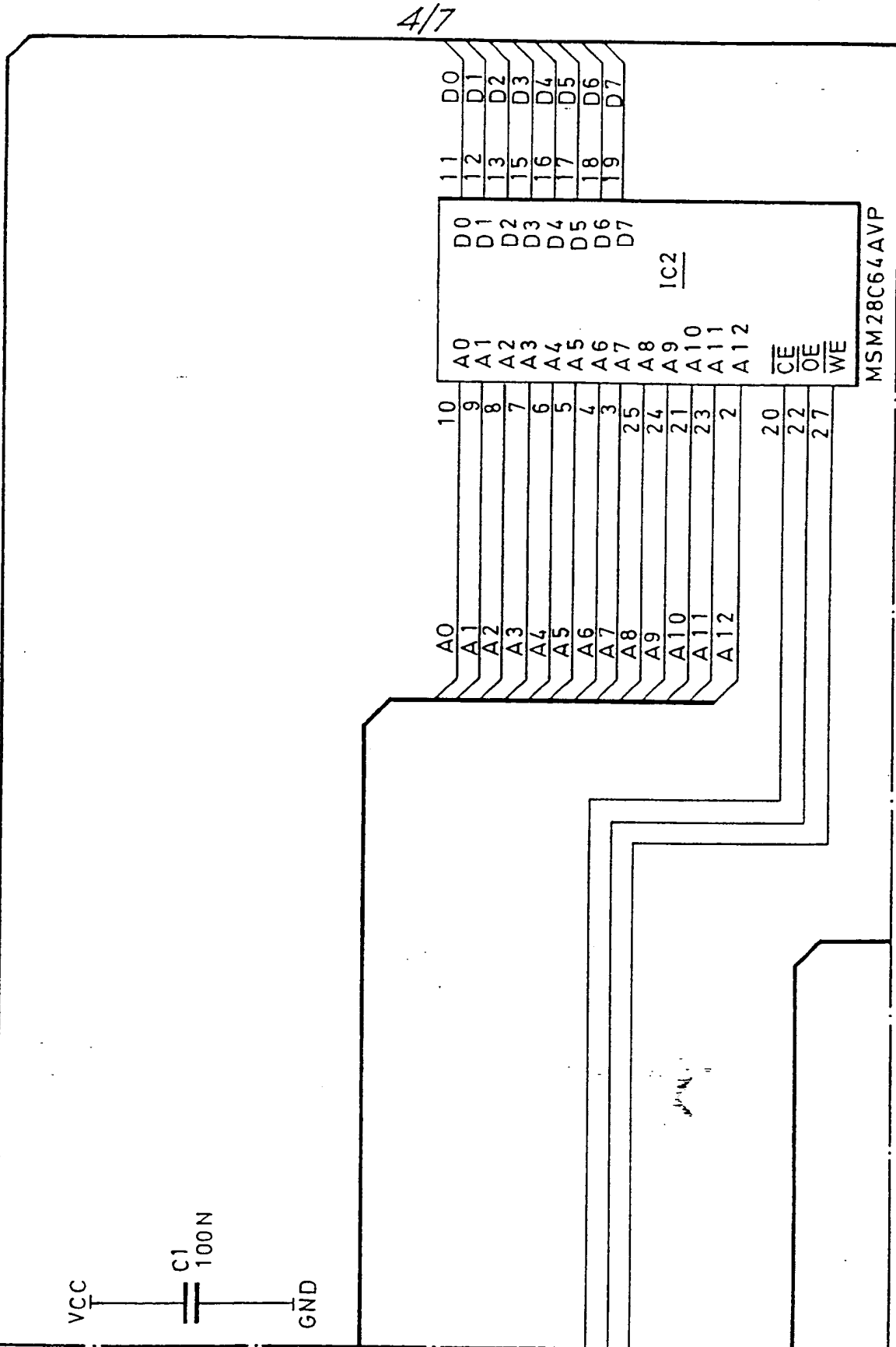


FIG. 3(ii)

FIG. 3(iii)



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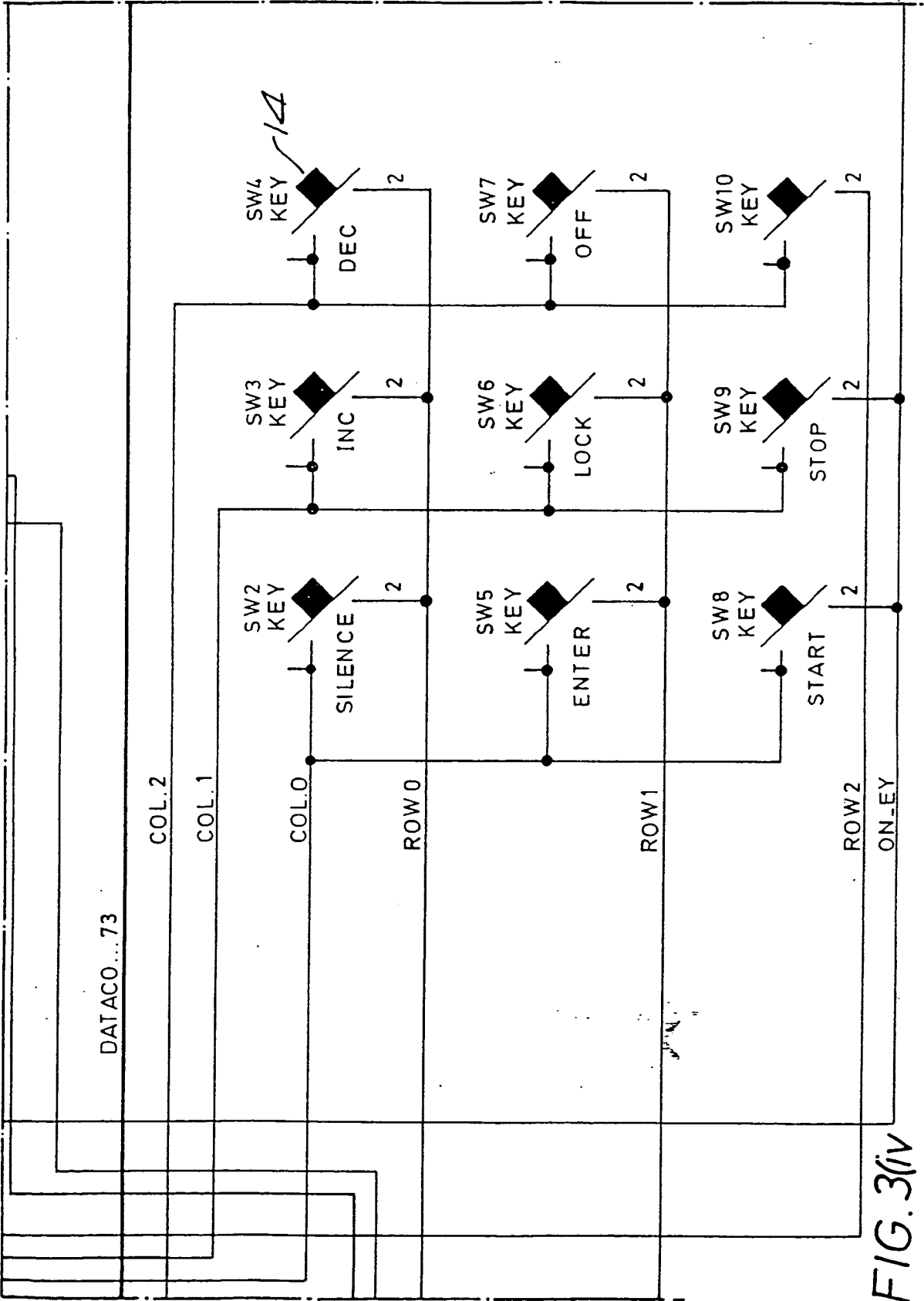


FIG. 3(iv)

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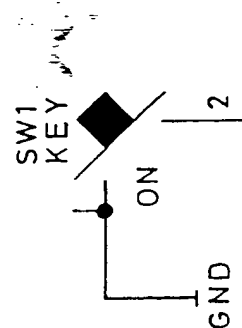
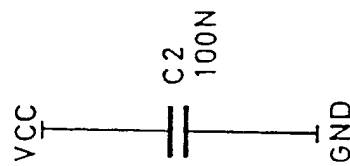
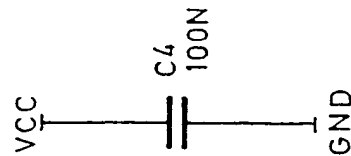


FIG. 3(v)

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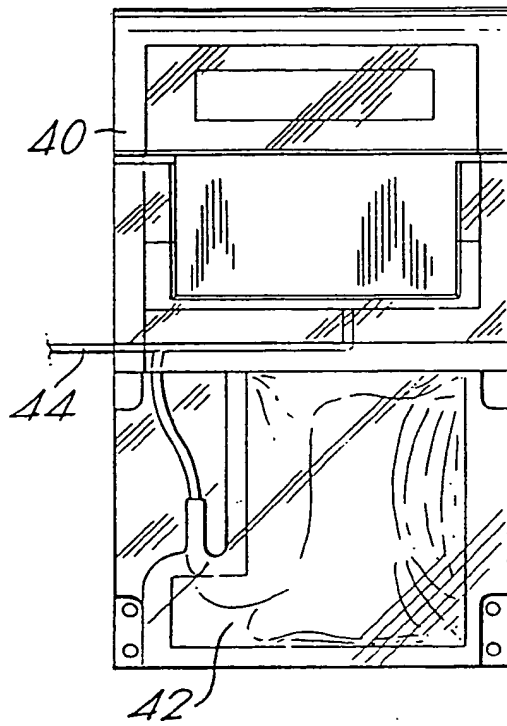


FIG. 4

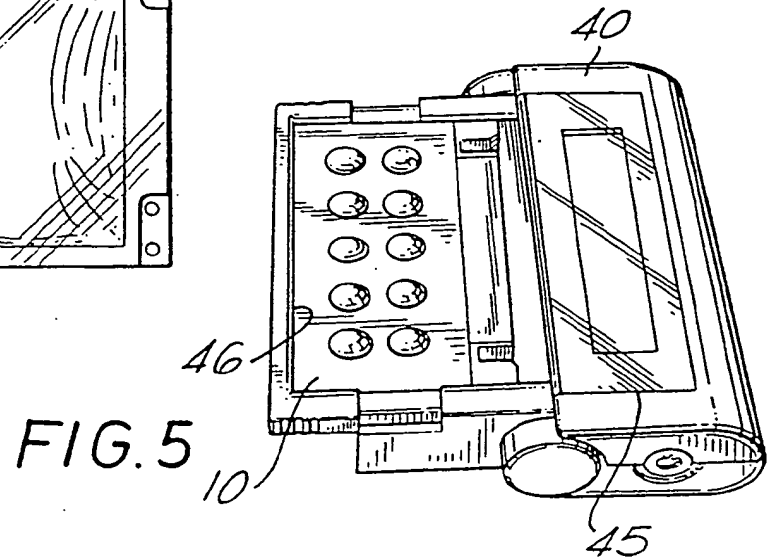
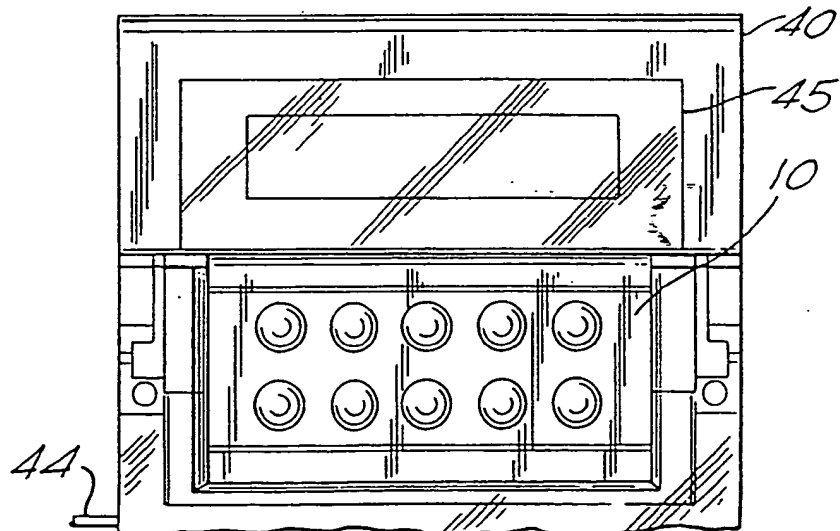


FIG. 5

FIG. 6



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 93/01965

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G05B19/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 G05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,36 37 684 (SHARP K.K.) 7 May 1987 see abstract see column 1, line 63 - line 66 see column 2, line 21 - line 47 see column 5, line 15 - line 38 see figure 2	1-6
Y	---	7-9
X	FR,A,2 616 941 (PHOTOWATT INTERNATIONAL S.A.) 23 December 1988 see page 3, line 28 - line 32 see figure 2	1,3,4
A	---	2,5,6
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Date of the actual completion of the international search

29 November 1993

Date of mailing of the international search report

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR,A,2 583 538 (BRECHET MICHEL) 19 December 1986 see page 2, line 13 - line 27 see claims 1,6; figure 1	1,3,4
A	---	2,5,6,8
P,Y	DE,A,41 35 577 (FA. NORBERT NEU) 6 May 1993 see abstract	7
A	---	7
A	EP,A,0 501 092 (COMELZ S.P.A.) 2 September 1992 see column 5, line 1 - line 12	7
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A	---	1-4,6
A	US,A,4 406 235 (EGUCHI) 27 September 1983 see the whole document	1-4,6
A	---	8,9
A	EP,A,0 316 280 (MEDICOMPEX S.A.) 17 May 1989 see abstract see claims; figure 1 -----	8,9

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

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FR-A-2583538	19-12-86	FR-A- 2608800	24-06-88
DE-A-4135577	06-05-93	NONE	
EP-A-0501092	02-09-92	NONE	
US-A-4308866	05-01-82	CA-A- 1146224 CA-A- 1165403 GB-A- 2039083 JP-A- 55105771	10-05-83 10-04-84 30-07-80 13-08-80
US-A-4406235	27-09-83	NONE	
EP-A-0316280	17-05-89	CA-A- 1298621 JP-A- 1155865 US-A- 5033469	07-04-92 19-06-89 23-07-91

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FIG. 1

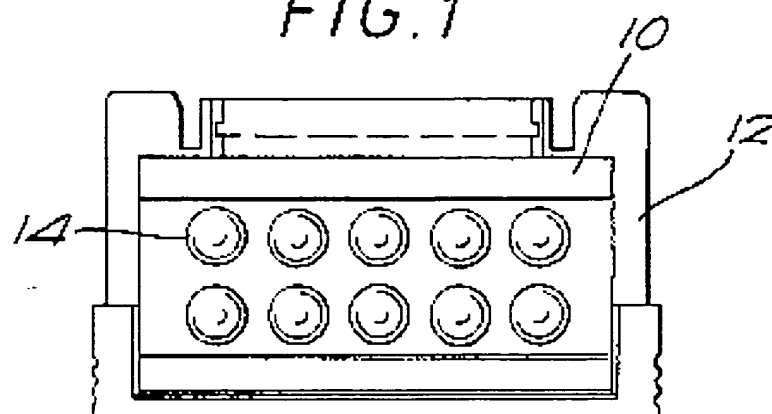
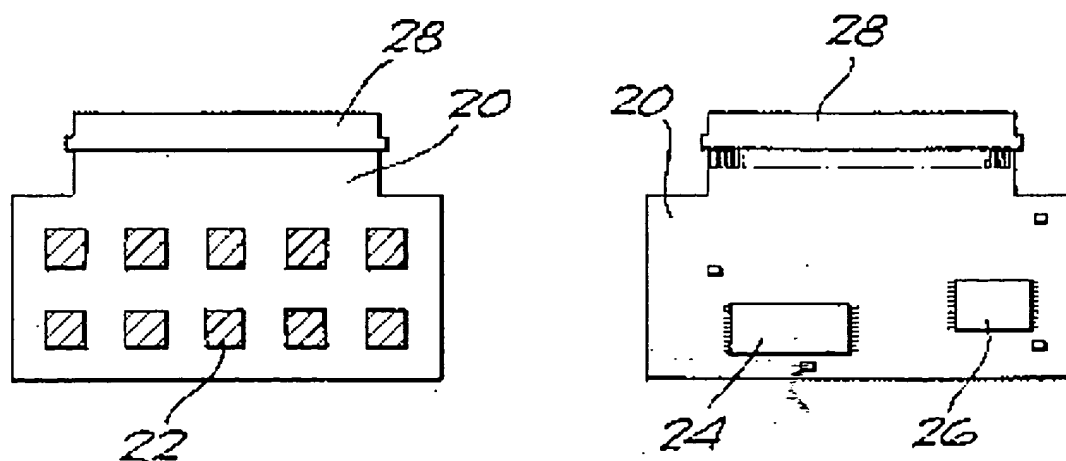
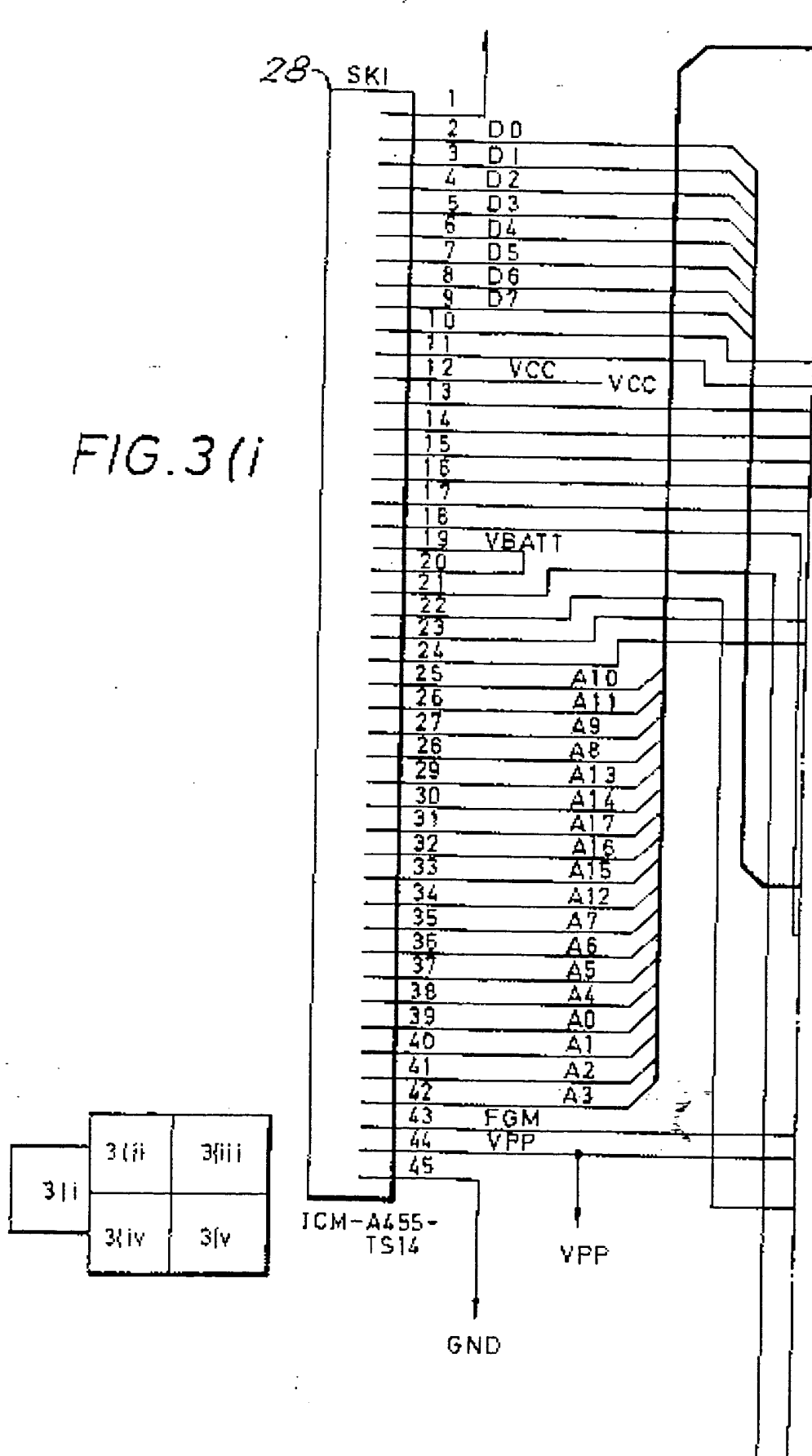


FIG. 2



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FIG. 3(i)



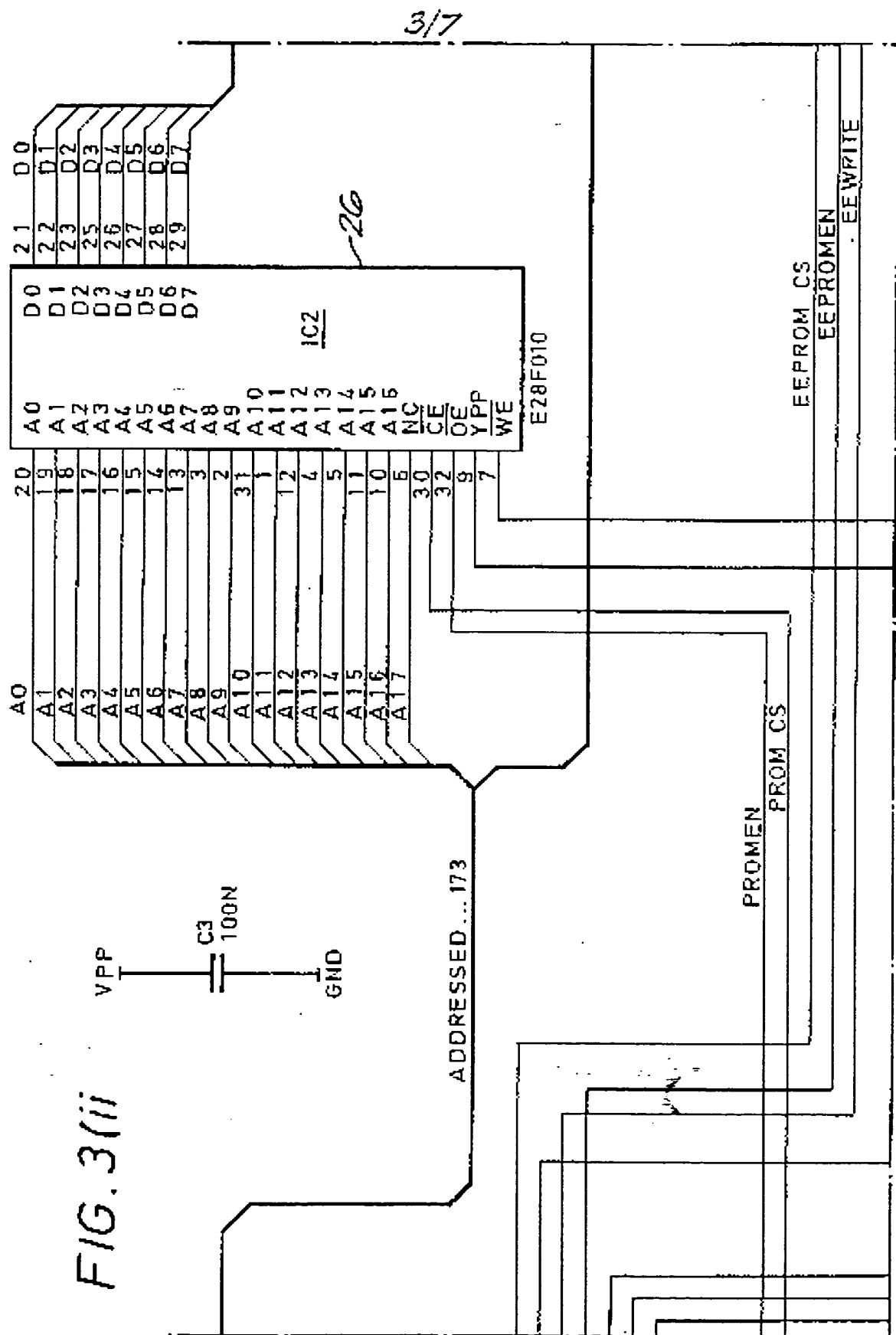
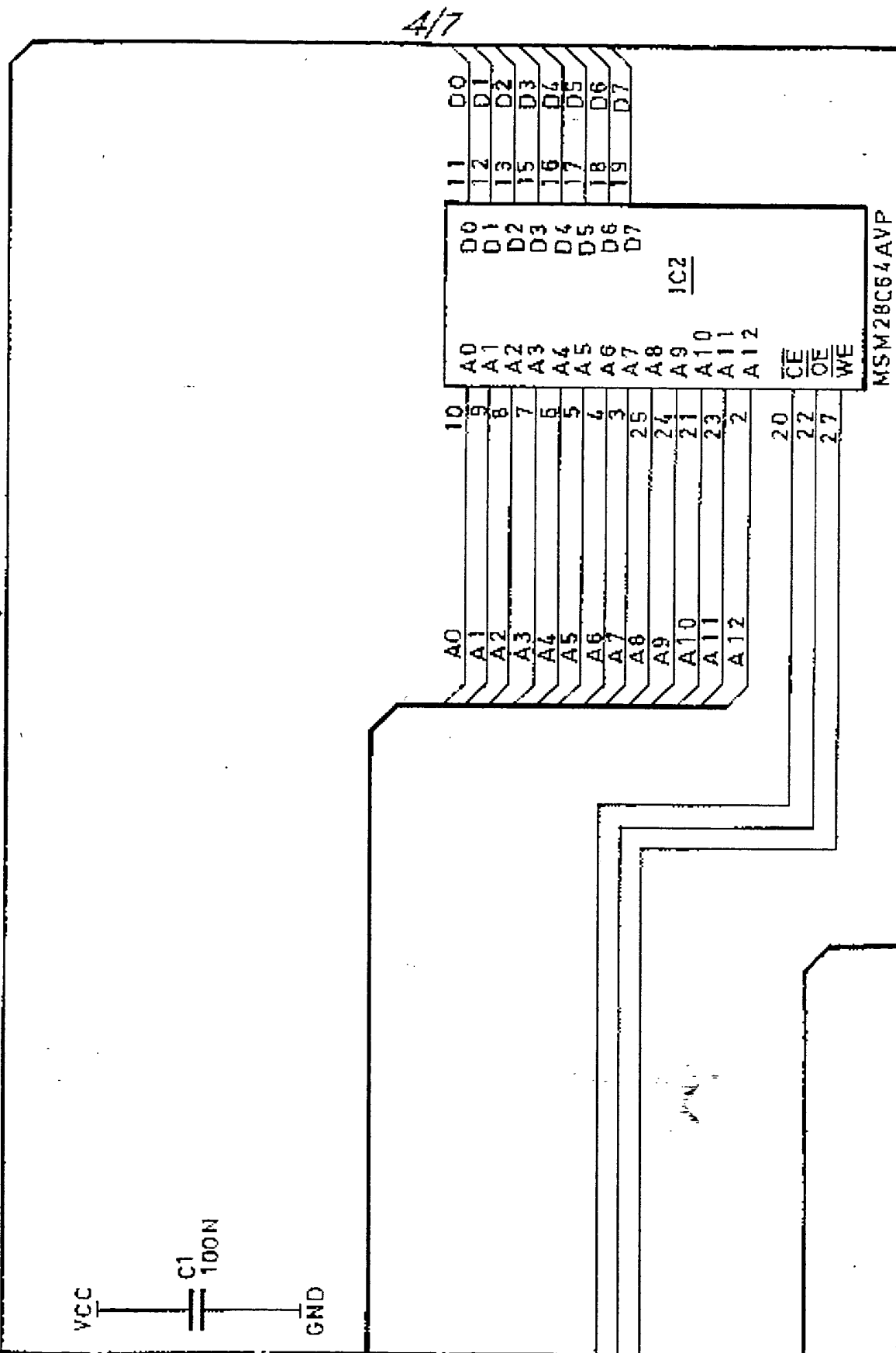


FIG. 3(iii)



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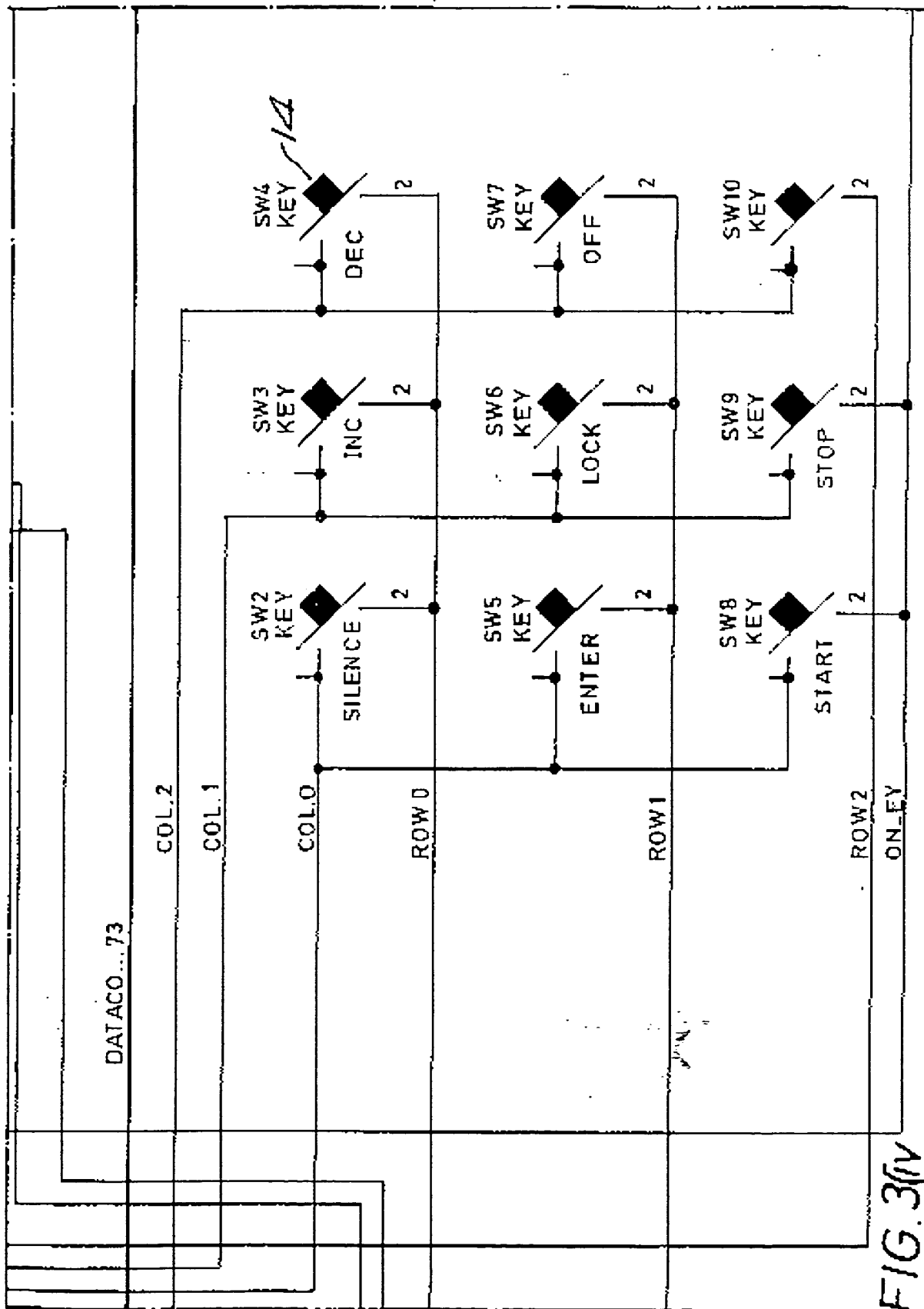


FIG. 3(v)

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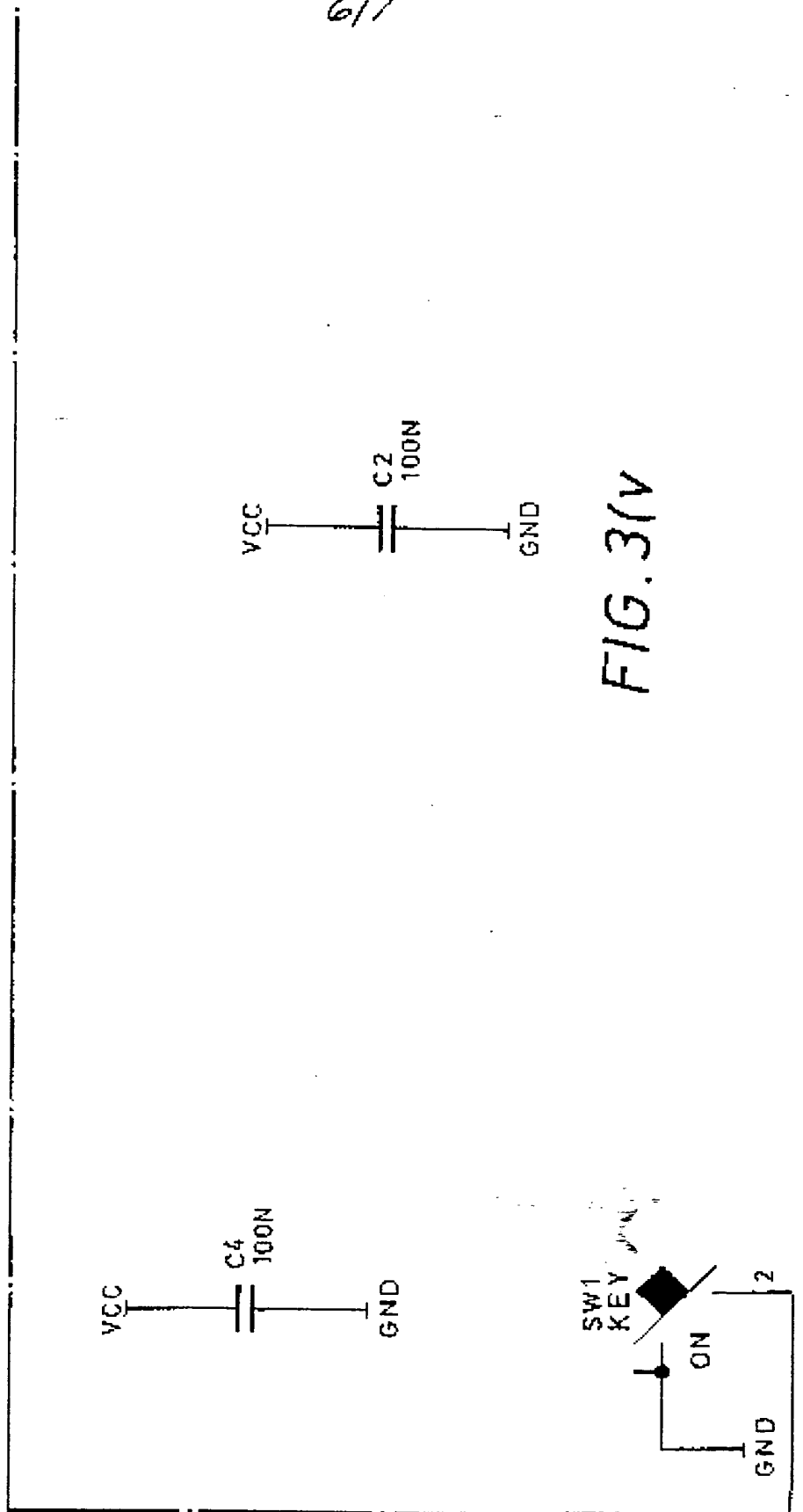


FIG. 3(v)

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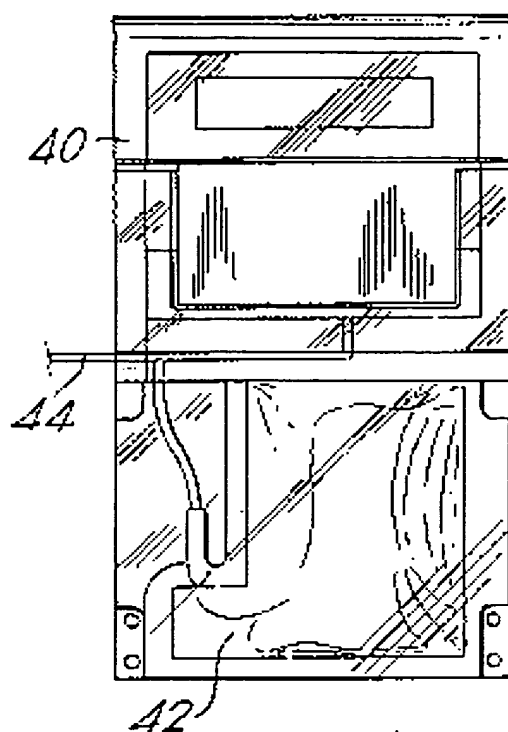


FIG. 4

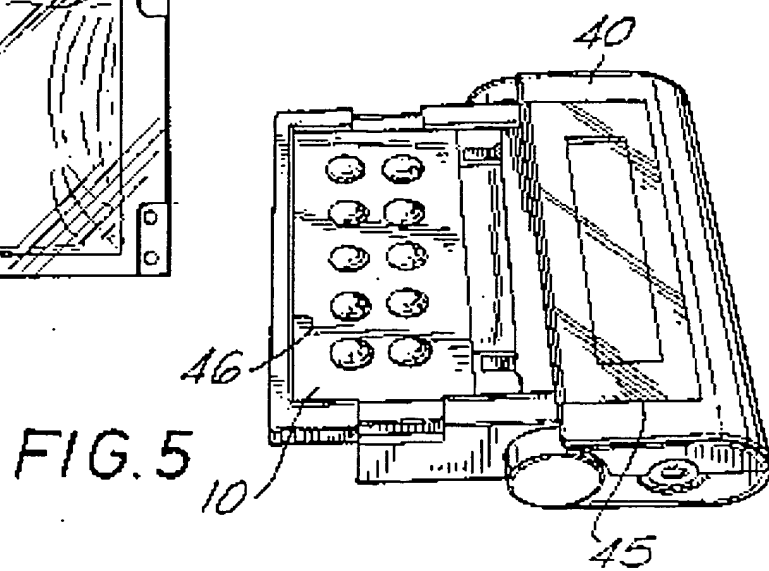
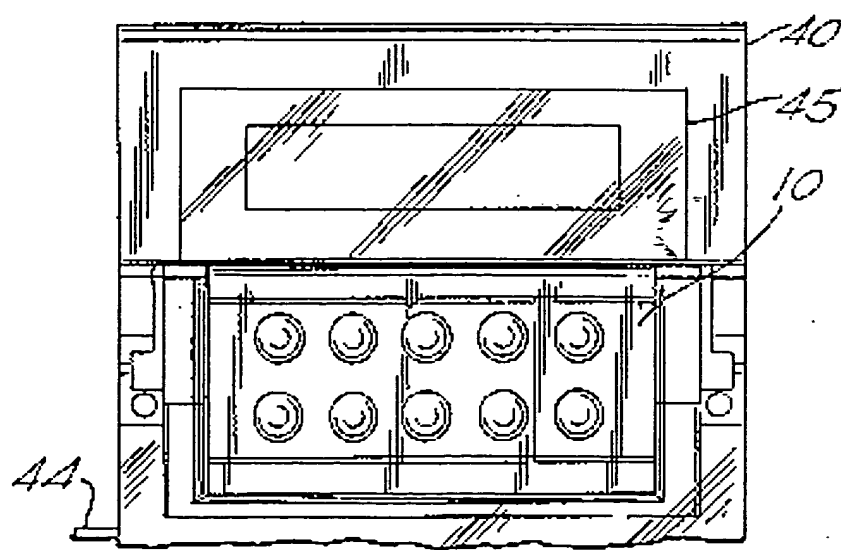


FIG. 5

FIG. 6



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